Technology
A Foundation for Transformation
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Overview

- **Transformation: Capabilities-Based Approach**
- **S&T Investment and Transformation**
- **Technology Transition to the Warfighter**
- **National Security Workforce and Laboratories**

Definition of Transformation

“The Evolution and Deployment of Combat Capabilities That Provide Revolutionary or Asymmetric Advantages to Our Forces”

- QDR (Sep 30, 2001)

QDR Critical Capabilities

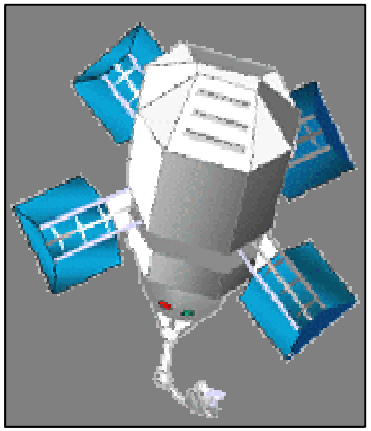
- **Protect Bases of Operations**
- **Conduct Information Operations**
- **Project and Sustain US Forces**
- **Deny Enemy Sanctuary**
- **Conduct Space Operations**
- **Leverage Information Technologies**

Protecting Bases of Operations

- ***Combating Terrorism***
- ***Chemical/Biological Defense***
- ***Missile Defense***
- ***Consequence Management***

Conduct Information Operations

- ***Defensive IO and Information Assurance***
- ***Offensive IO***



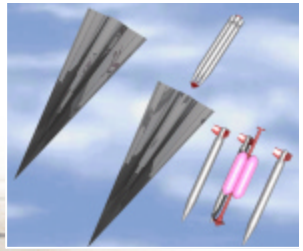
Project and Sustain US Forces

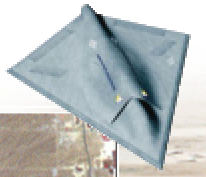
- ***Anti-Access Capabilities***

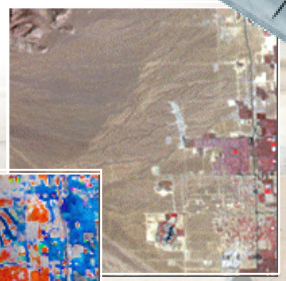
Deny Enemy Sanctuary

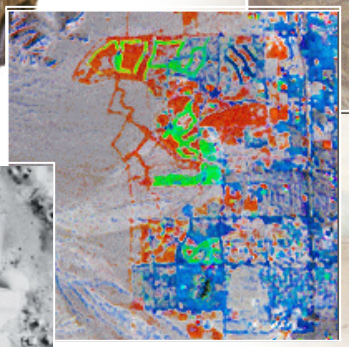
Persistent Surveillance, Tracking and Rapid Engagement with Precision Strike

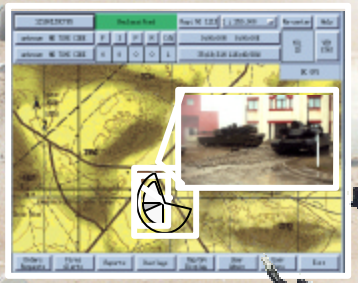
- ***Remote Sensing/Enhanced C4ISR***
- ***Unmanned Aerial Vehicle***
- ***Long-Range Precision Strike***
- ***Small-Diameter Munitions***
- ***Defeat Hard and Deeply Buried Targets***





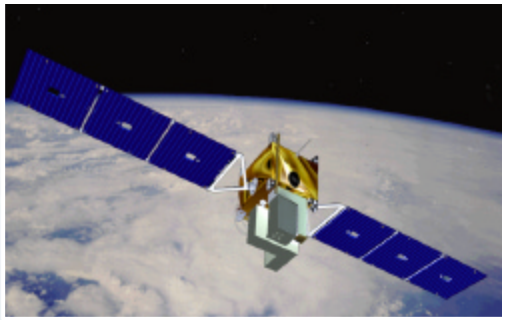


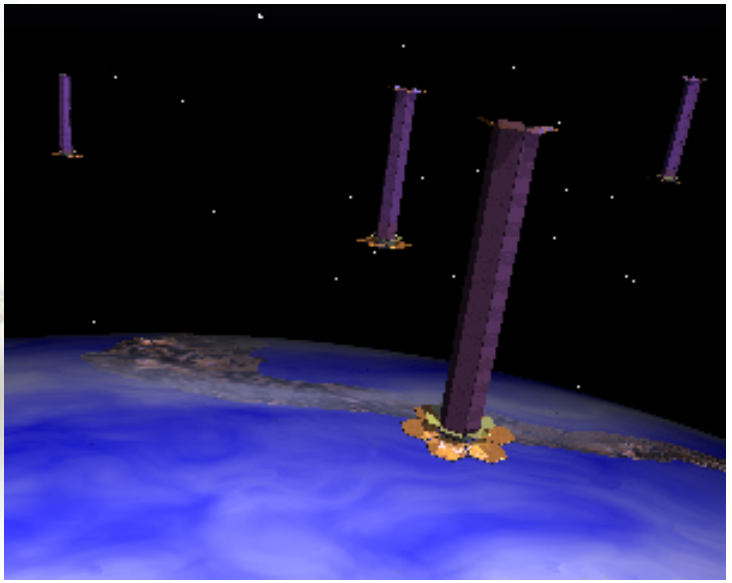




Conduct Space Operations

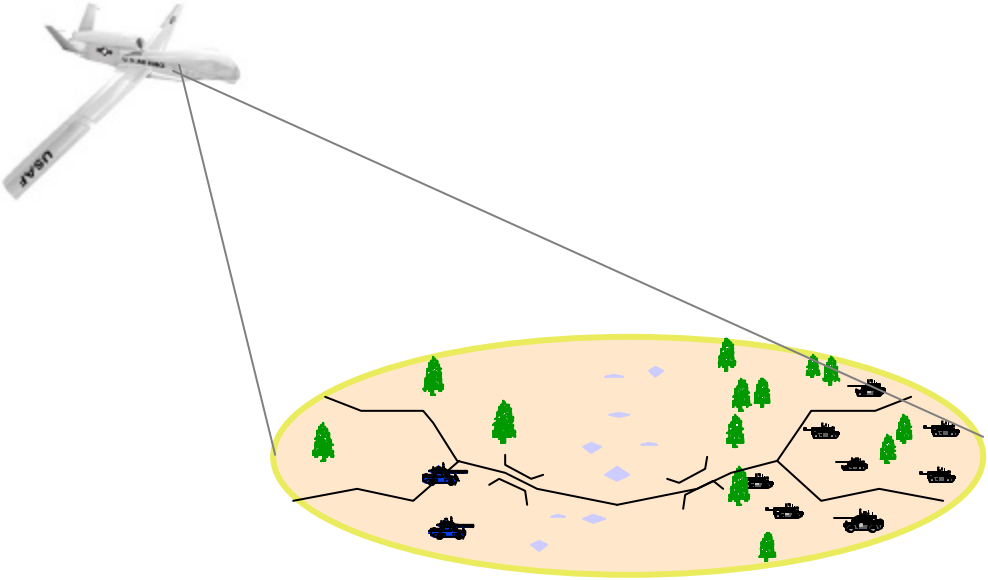
- ***Ensure Access to Space***
- ***Protect Space Assets***
- ***Space Surveillance***
- ***Control Space***
- ***Sub-Orbital Space Vehicle***

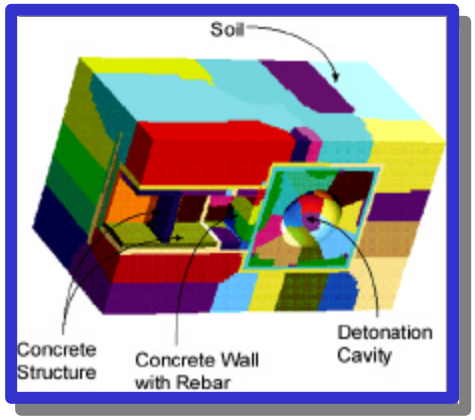




Leverage Information Technologies

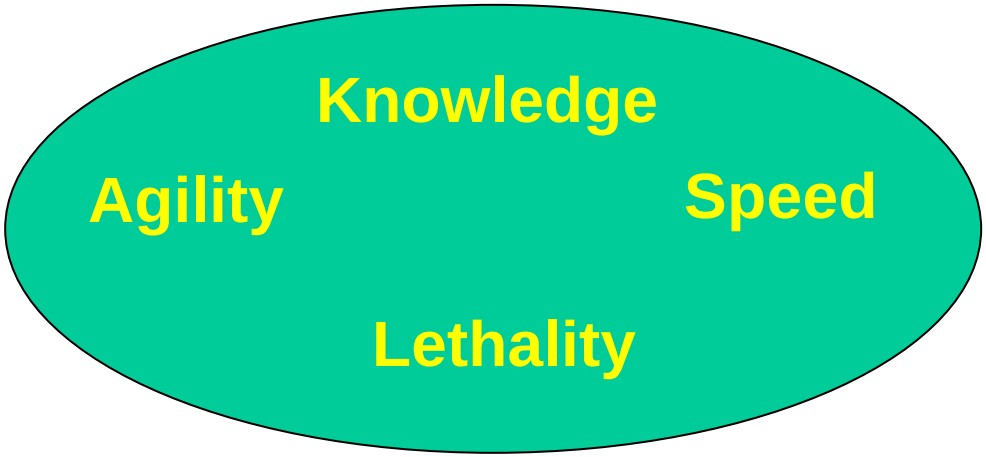
- ***High-capacity Interoperable Communications***
- ***Survivable, Improved, Tactical and Strategic Communications***
- ***End-to-end C4ISR***





Technology and Transformation

- **Transformation Attributes**



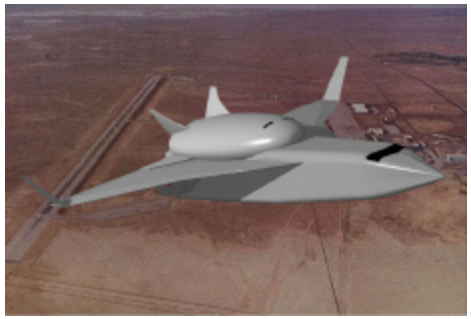
- **Transformation Technology Initiatives**
  - **National Aerospace Initiative**
  - **Advanced Reconnaissance and Knowledge Architecture**
  - **Power and Energy Technologies**

National Aerospace Initiative
- *Strategic and Tactical Framework*

- **Hypersonics**
  - **Strategic Strike, Time Critical Targets, Strategic Stealth, Suborbital Vehicles, UCAVs, Fast Transportation, etc.**
- **Access to Space**
  - **TSTO: 1st - Air Breathing, 2nd - Rocket; SSTO**
- **Advanced Space Technologies**
  - **Microsats, Multifunction Satellites, etc.**

National Aerospace Initiative Approach

Space Access



Weapons

RLV (Affordable, timely access to space)

Hypersonic Cruiser (Global Reach/Attack)

Far-Term

Supersonic/Hypersonic Missiles (Time-critical targets)

Mid-Term

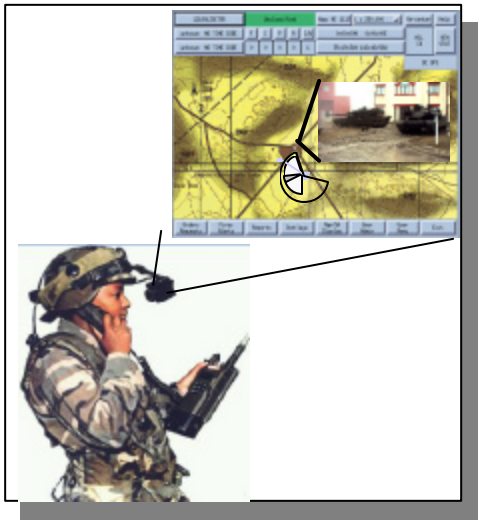
Near-Term

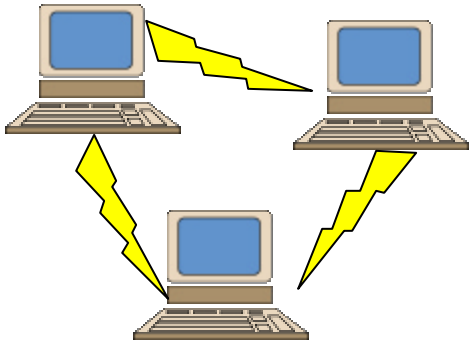
Pursue Stepping-Stone Approach

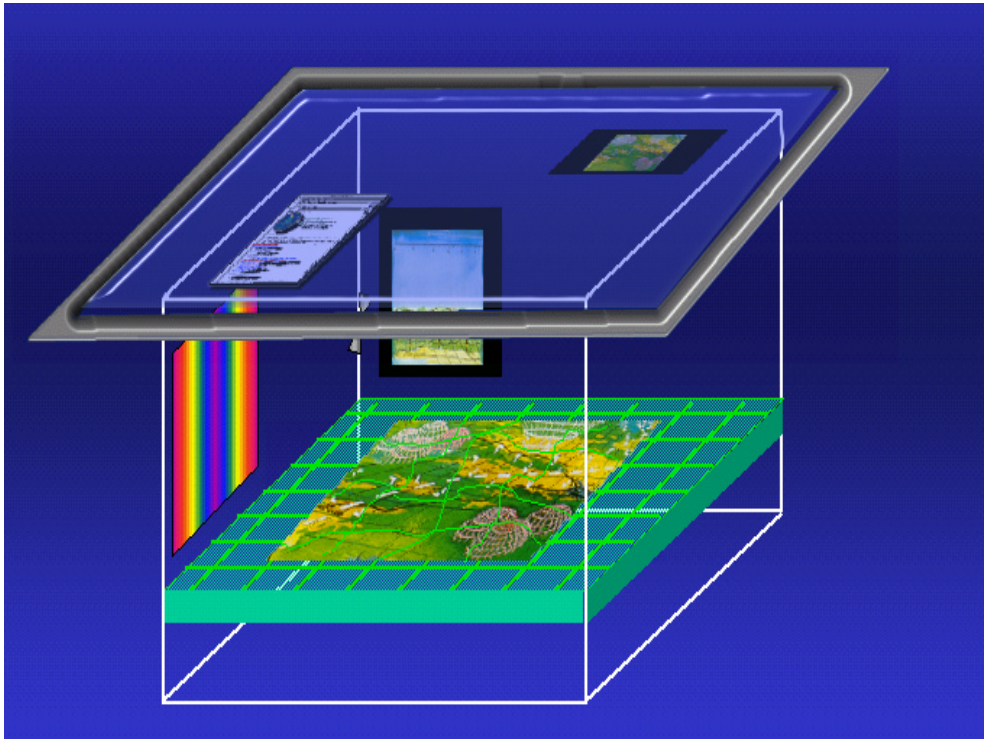
Advanced Reconnaissance & Knowledge Architecture - *C4ISR*

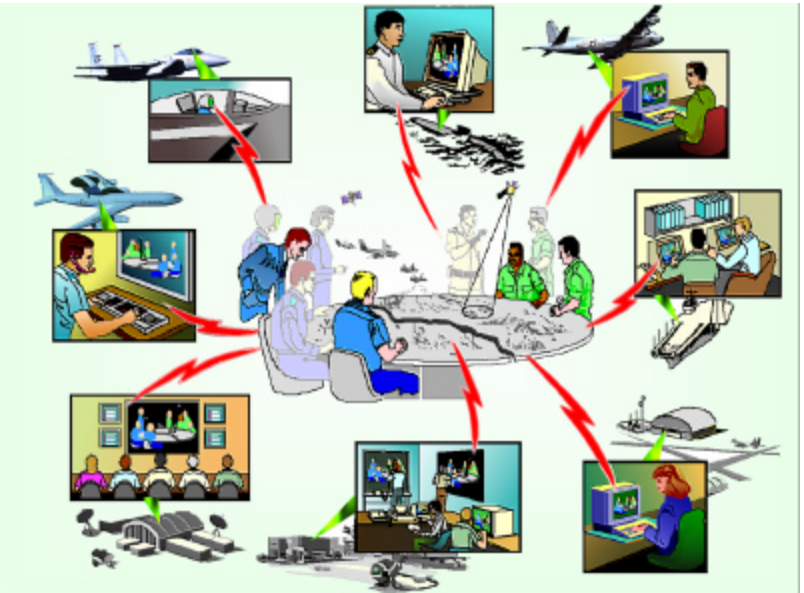
- **Sensors and Unmanned Vehicles (Robotics, UAVs, etc.)**
- **High Bandwidth Communications / Information Assurance**
- **Information / Knowledge Management Systems**
- **Cyber Warfare**

Advanced Reconnaissance & Knowledge Architecture









Power and Energy Technologies
- Enabling An "Electric" Force

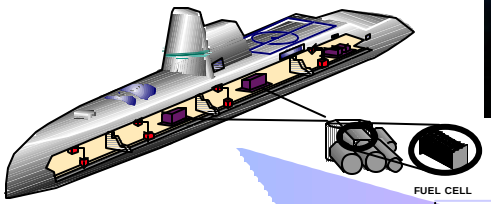
- **Power Generation**
  - **Nuclear, Diesel, Jet Engine, Solar Array, Fuel Cells, etc.**
- **Energy Storage**
  - **Batteries, Fly Wheels, Capacitors, Energetics, etc.**
- **Power Management and Control**
  - **Energy Conversion, Catapults, etc.**
- **Directed Energy Weapons**
  - **Lasers, Microwave, etc.**

Power and Energy Technologies

POWER GENERATION
- Fuel Cells & Fuel Reforming
- Novel Power

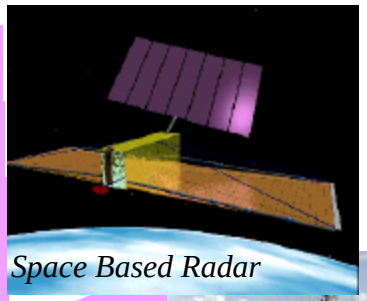
ENERGY STORAGE
- Batteries
- Capacitors

POWER MANAGEMENT & CONTROL
- Switching & Conditioning
- Power Transmission & Distribution
- Thermal Management



Electric Warship

More Electric Aircraft

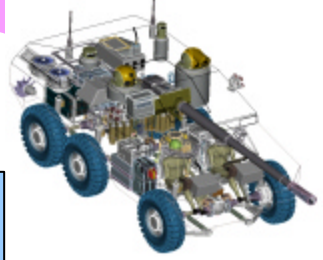


Space Based Radar

Electric Warship

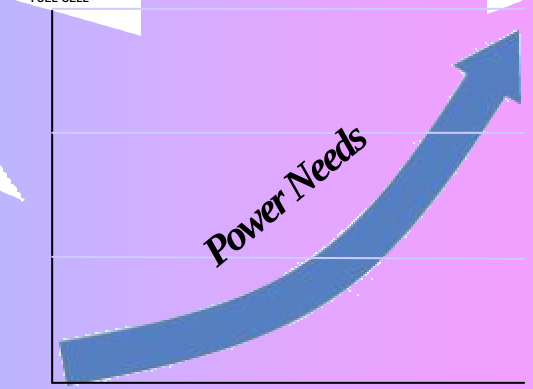
Warrior

High Power Microwave



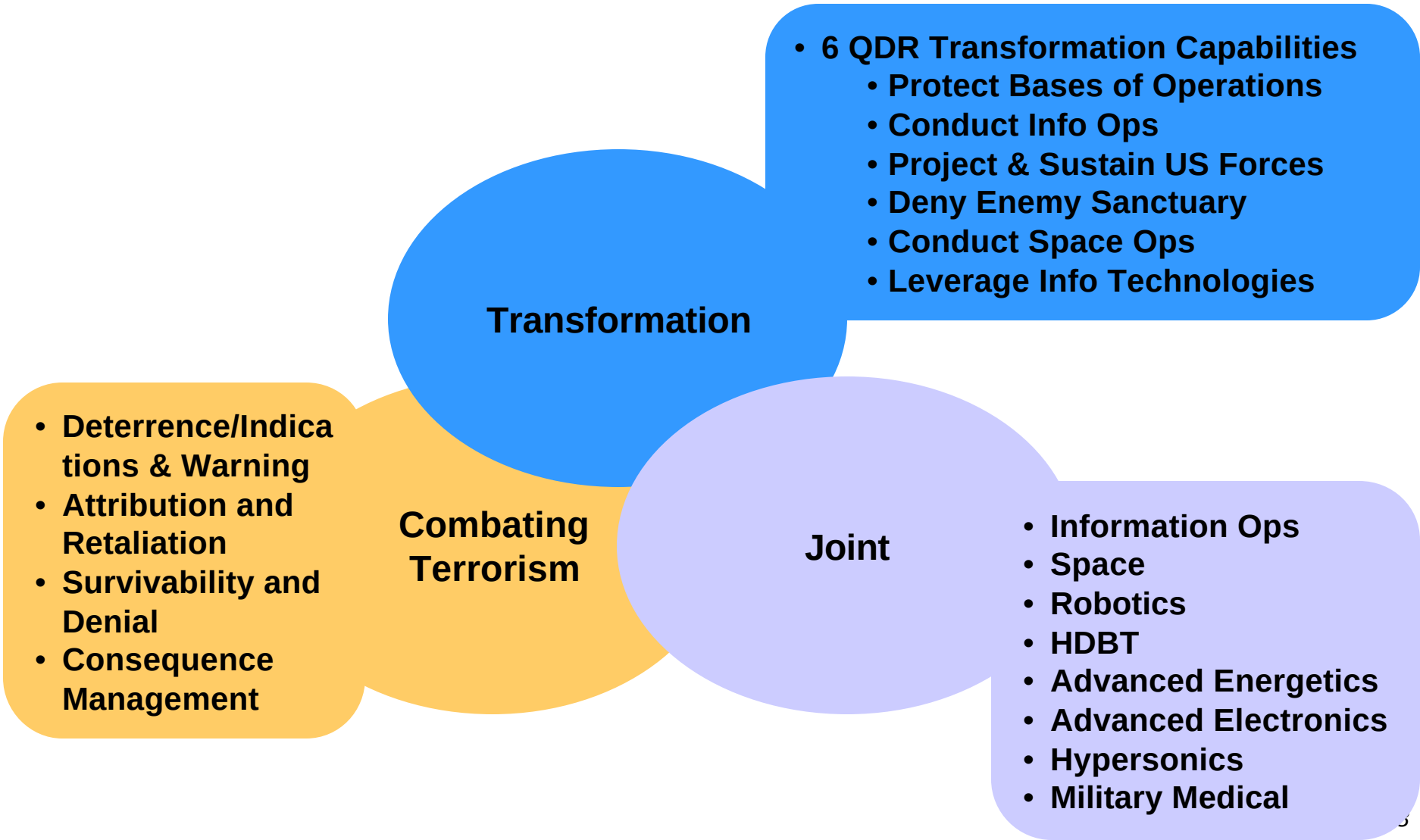
Hybrid/Electric Combat Vehicle

Electric/Hybrid Weapons



New Operational Capabilities

Science & Technology (S&T) Emphasis Areas



Robust S&T Investment Enables Transformation

- S&T Investment Aligned With DoD Goals
- New Transformation Initiatives Focus on Intersection of Transformation, Joint, and Combating Terrorism
- Balance S&T Investment
  - Between Service / Agencies
  - Near / Far Term Research
- Increase S&T Investment in Critical Capabilities per QDR

Accelerate Technology Transition to the Warfighter

- On-going, Stable S&T Investment Allows Technologies to Be Ready for Transition
- Complementary Programs Necessary
  - Quick Reaction Funds
  - Advanced Concept Technology Demonstration
  - Formal Spiral Acquisition
- Technology Transition a Focus for AT&L Leadership Under Acquisition Excellence

Technology Transition

- **Objective:**
  - **Accelerate the insertion and deployment of technology to the warfighter to improve operational military capability**

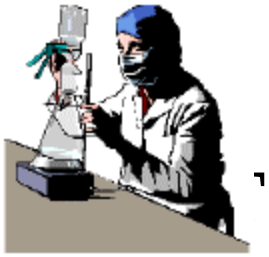
- **New / Enhanced Capability Achievable Through:**
  - **Higher Performance Components and Systems**
  - **More Affordable Technology**
  - **Technology Demonstrations**
  - **Fieldable Prototypes**
  - **Industry involvement**
  - **Flexible availability of technology (GSA schedule)**

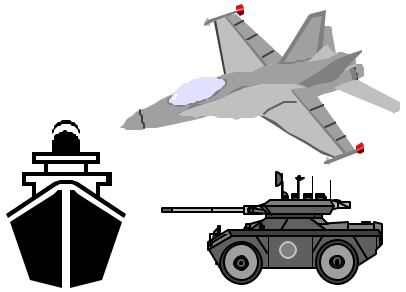
A Complete Technology Transition Effort Has Multiple Facets

Best Practices

All Services are moving their acquisition processes

FROM





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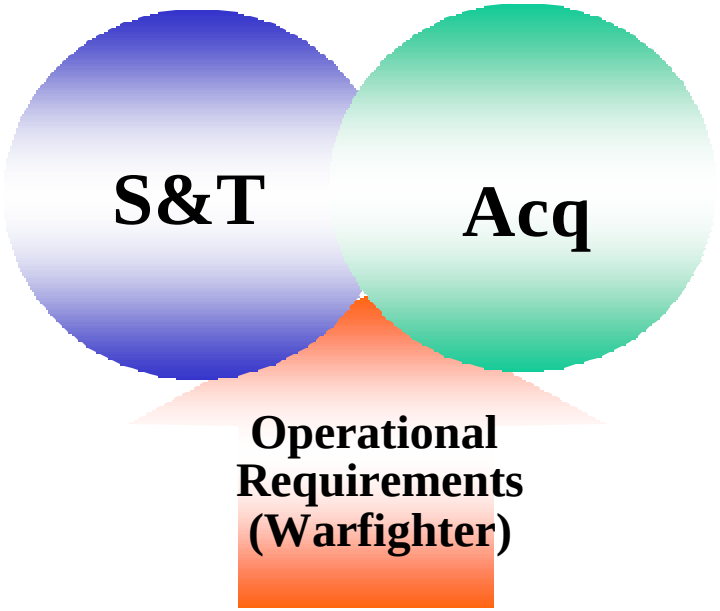


Right
- *Technology*
- *People*
- *Time*

Thermobaric Weapons -
Case Study In Rapid Technology Transition

- **A "Quick Reaction" type development, enabled by base S&T program and ACTD Framework**
- **Chronology: Program Approved September 21, 2001**
  - **Small Quantity Lab Testing – Oct**
  - **Full Up Static Test – Nov 17**
  - **Flight Test - Dec 14**
- **Team: USN, DTRA, USAF, DOE**

Chemistry → ***Weapon***

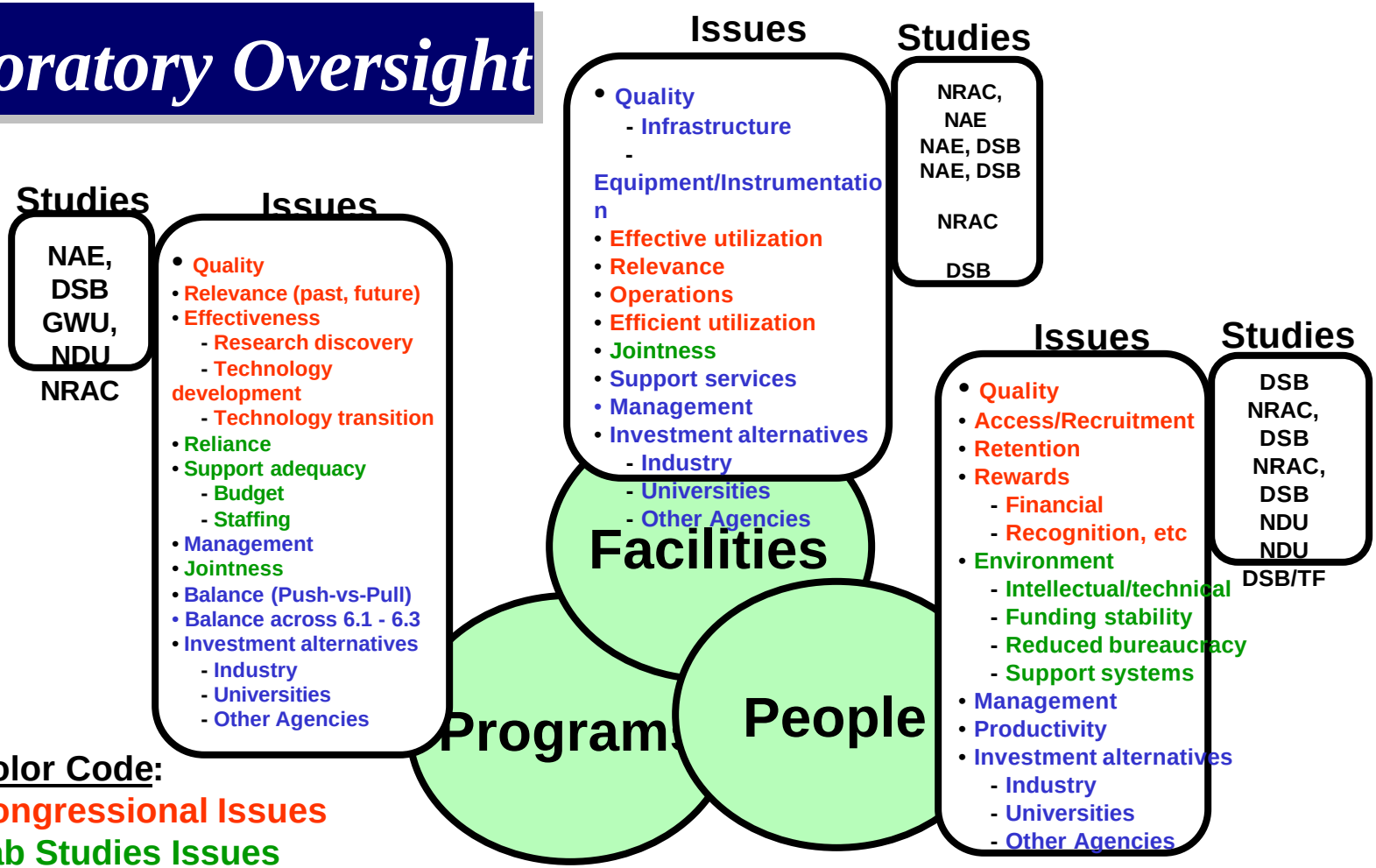
3 months

National Security Workforce and Laboratories

- DoD Investment in University-based Research Increases the National Workforce in Critical Technology Areas
- Expanded Use of Workforce Pilot Programs Will Strengthen Labs
- Laboratories Supporting National Security Need to Modernize Infrastructure

Laboratories & People

"Laboratory Oversight



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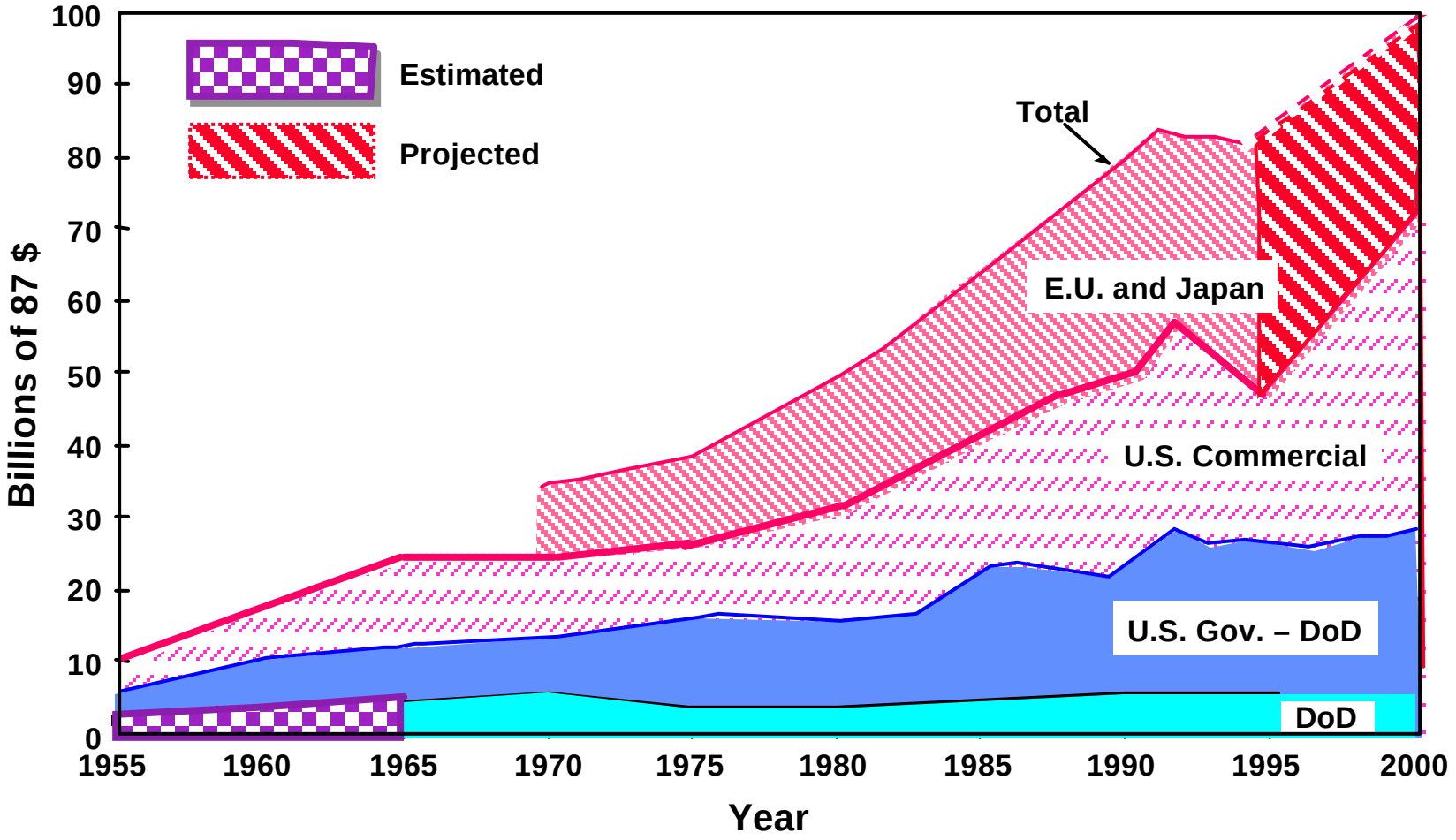
Congressional Issues

Lab Studies Issues

DDRE Oversight Issues

25

U.S. and Worldwide Research Base Since WWII



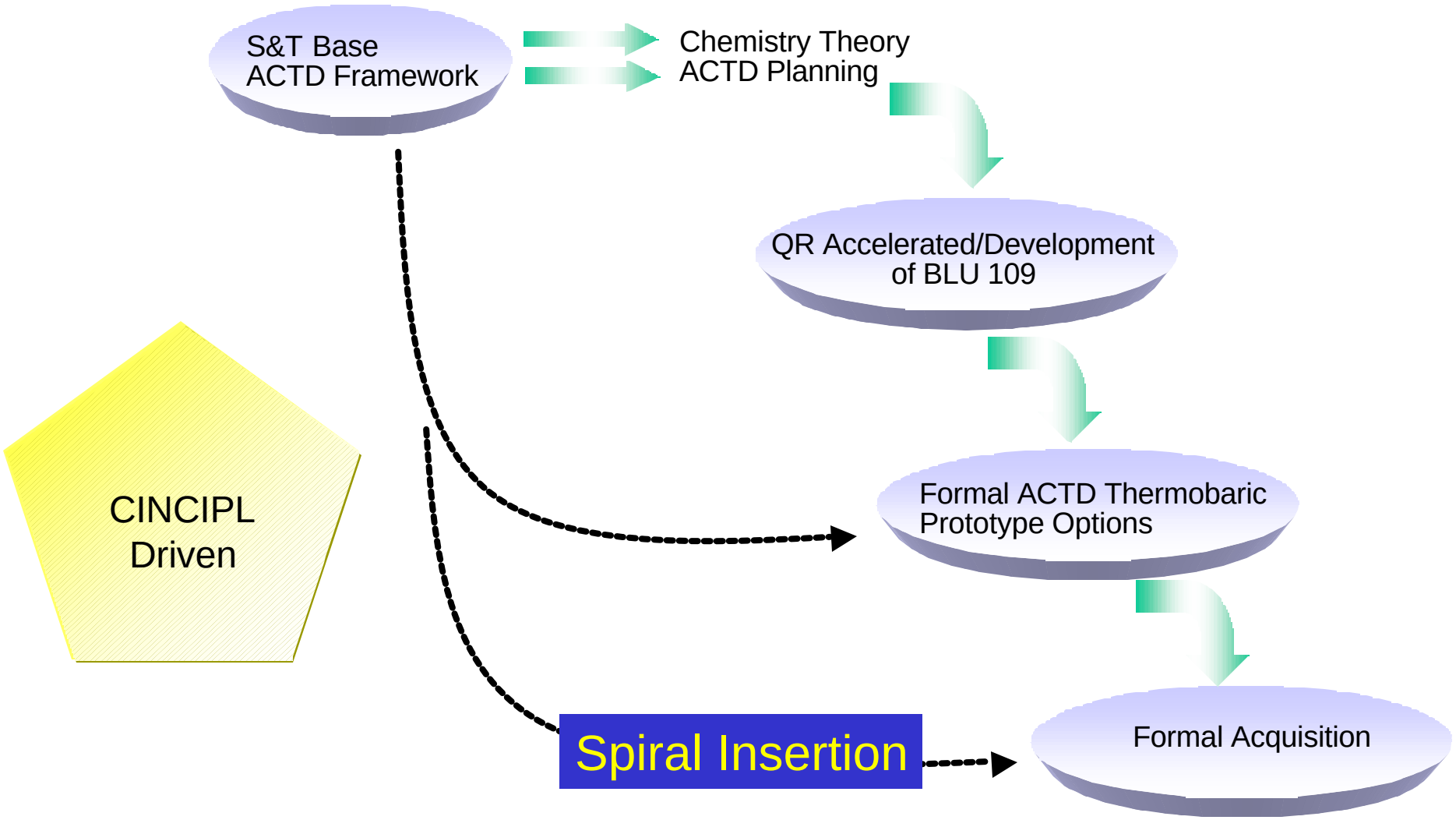
Source: Report of the Defense Science Board Task Force on the Technology Capabilities of Non-DoD Providers; June 2000; Data provided by the Organization for Economic Cooperation and Development & National Science Foundation

Summary

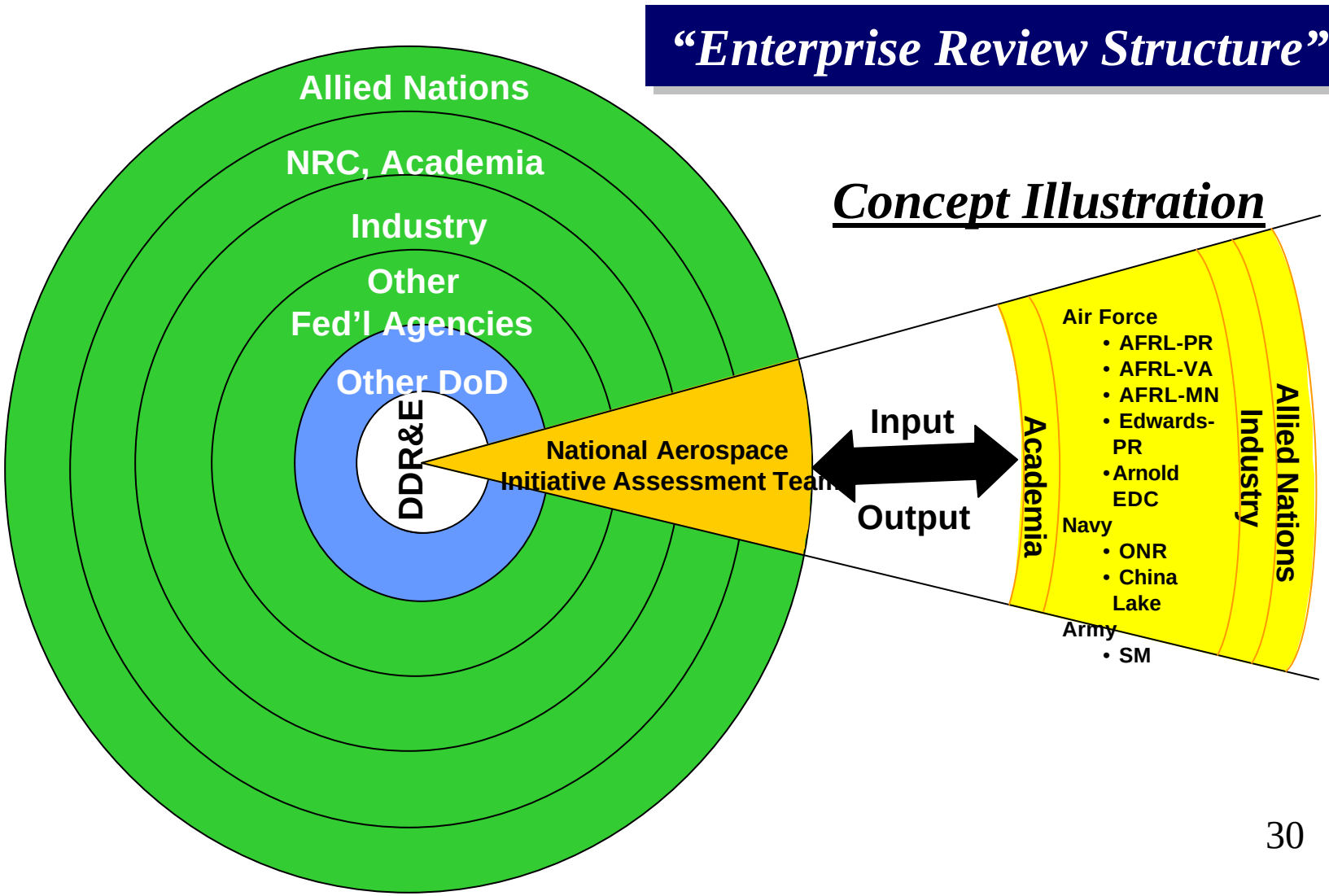
- **Robust Defense Research and Engineering is Vital to Transforming the Force**
- **Accelerated Technology Transition is Critical to Realizing Transformation**
- **National Security Workforce and Laboratories Must Be Aligned with QDR Capabilities-Driven Transformation**

BACKUPS

Complimentary Transition Efforts Accelerate “Thermobaric Weapons”



Laboratories & People



DoD CTO Responsibilities

- **Principal Advisor to the "CEO" (SECDEF) for Technical Matters**
- **Responsibilities**
  - **Provides Oversight / Assessment of the "State of the Art" in militarily relevant technologies:**
  - **Leads Change of Development of New/Transformational capabilities**
  - **Assesses Application of Technology to Acquisition Programs**
  - **Shapes the DoD Laboratories and Workforce**
- **Mechanisms**
  - **Policy**
  - **Financial**